

## Supporting information

### Enhanced thermoelectric properties of $\text{Cu}_{1.8}\text{S}$ via introducing ZnS nanostructures

Gouri Sankar<sup>a</sup>, Madhuvathani Saminathan<sup>b</sup>, Suresh Perumal<sup>c</sup>, Tamilarasi R<sup>a</sup> and Geetha Arunachalam<sup>a\*</sup>

<sup>a</sup> Department of Physics and Nanotechnology, Faculty of Engineering and Technology, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, 603203, India

<sup>b</sup> Department of Electrical Engineering, Indian Institute of Technology Madras (IIT M), Chennai, Tamil Nadu, 600036, India

<sup>c</sup> Laboratory for Energy and Advanced Devices (LEAD), Department of Materials Science and Metallurgical Engineering, Indian Institute of Technology Hyderabad (IIT H), Kandi, Sangareddy, Telangana 502284, India.

\*Corresponding author e-mail: [\\*geethaa@srmist.edu.in](mailto:geethaa@srmist.edu.in)

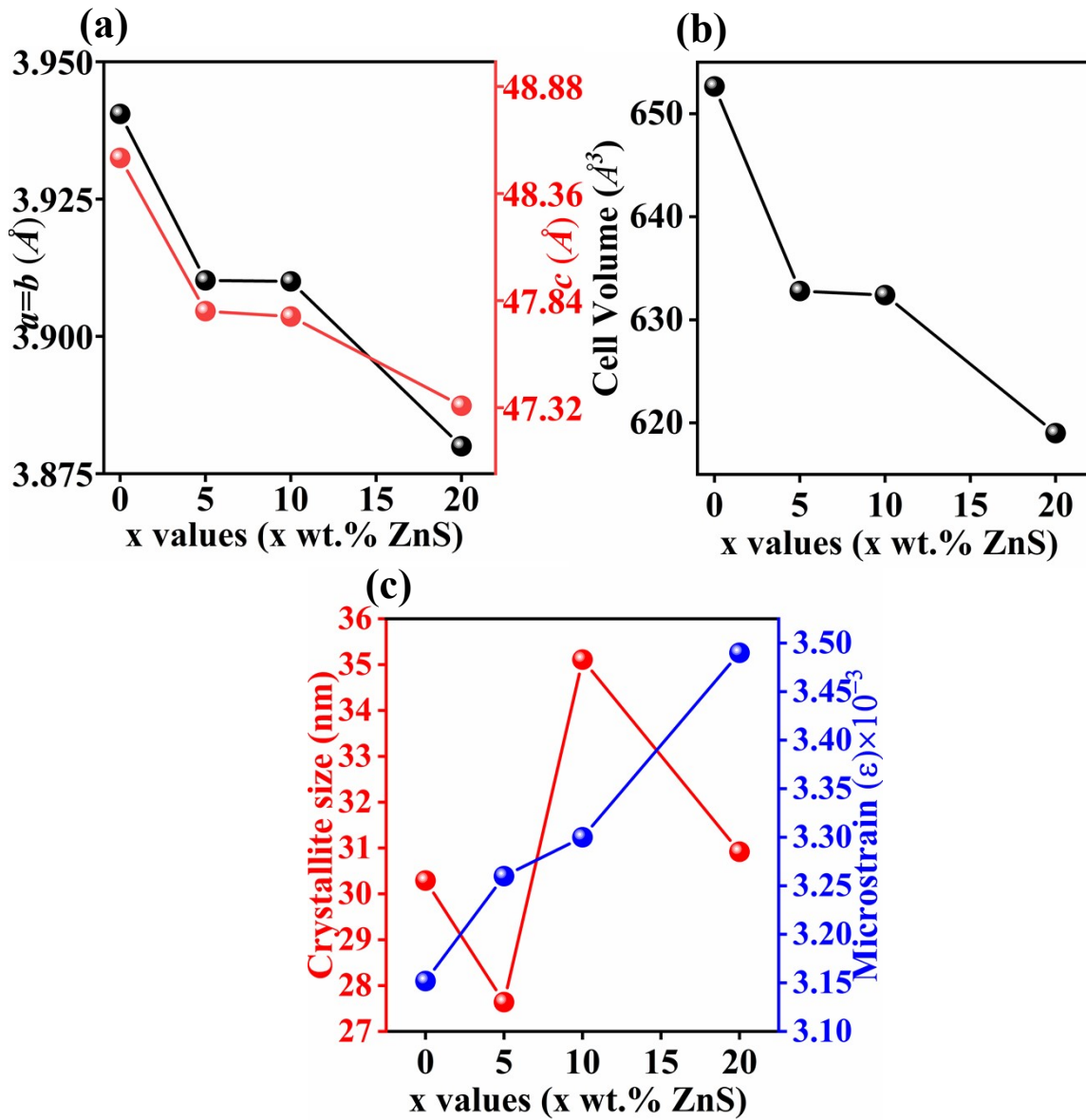


Figure S1 (a) Lattice parameters, (b) the cell volume of pellet samples and (c) crystallite size and micro strain plotted with respect to ZnS (x %) contents, respectively

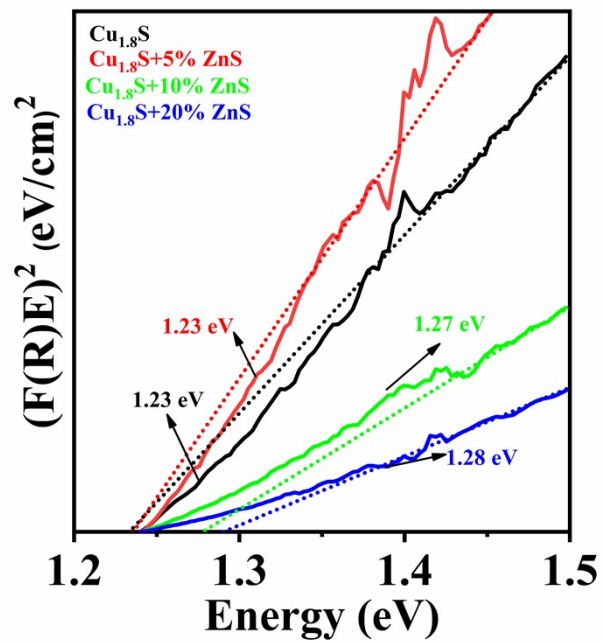


Figure S2 Optical absorption spectra of  $\text{Cu}_{1.8}\text{S}+x$  wt.% ZnS ( $x = 0, 5, 10$  and  $20$ ) samples

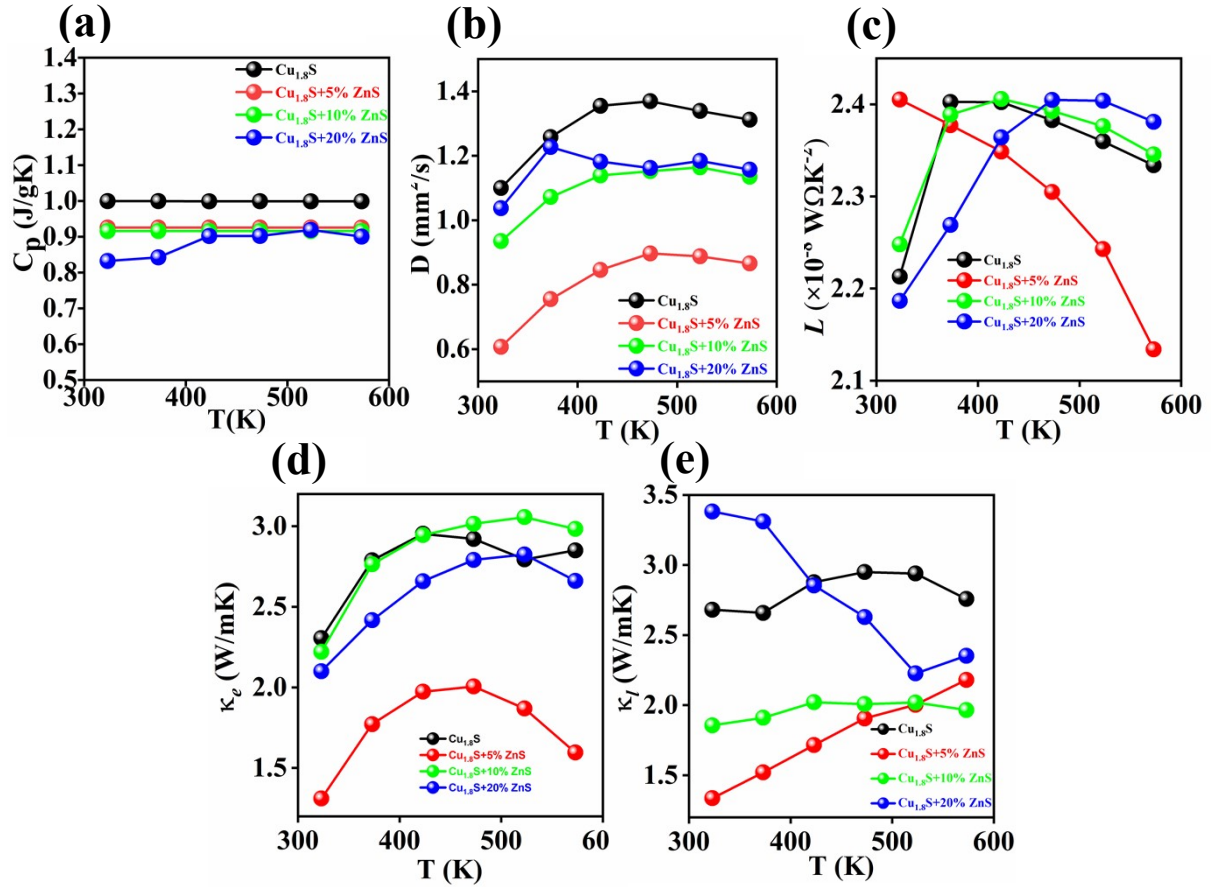


Figure S3 (a) specific heat capacity ( $C_p$ ), (b) diffusivity ( $D$ ), (c) and Lorentz number, (d) electronic thermal conductivity ( $\kappa_e$ ), (e) lattice thermal conductivity ( $\kappa_l$ ) of  $\text{Cu}_{1.8}\text{S} + x$  wt.% ZnS ( $x = 0, 5, 10$  and  $20$ ) as a function of temperature

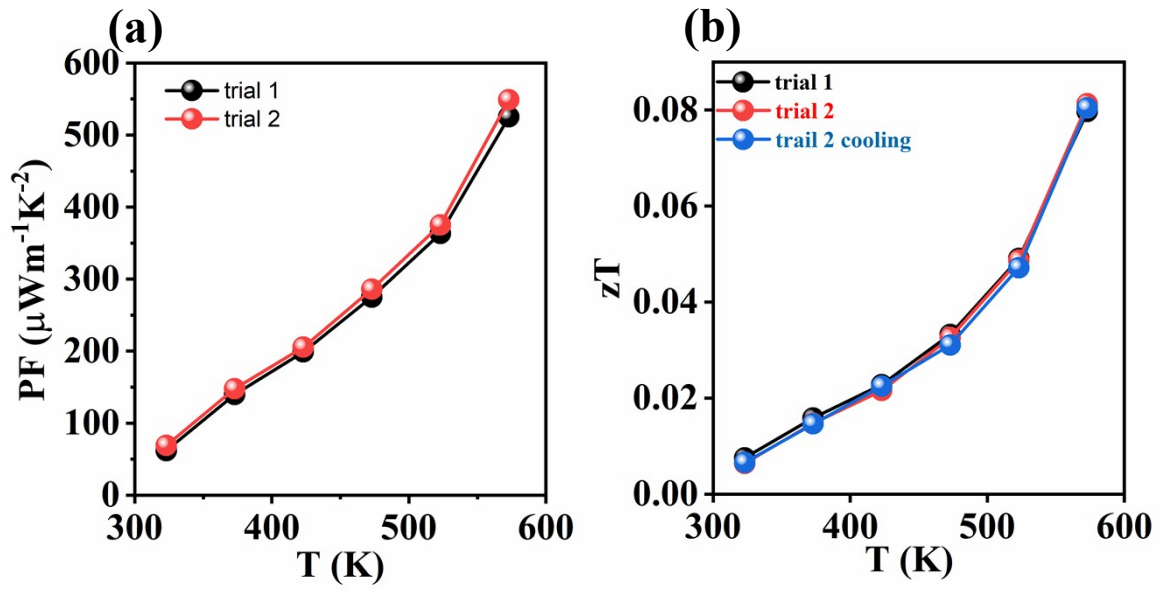


Figure S4 Repeatability graph of temperature-dependent (a) PF and (b) zT for  $\text{Cu}_{1.8}\text{S}+5\% \text{ZnS}$  composited sample (trial-2) in comparison with early result (trial-1) in the range of 323-573 K and cooling temperature dependent zT.